

Roe's Abalone (2018)

Haliotis roei



Lachlan Strain: Department of Primary Industries and Regional Development, Western Australia, **Katherine Heldt:** South Australian Research and Development Institute

STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Western Australia	Western Australia Area 2 Fishery	AMF	Sustainable	Catch, CPUE
Western Australia	Western Australia Area 5 Fishery	AMF	Sustainable	Catch, CPUE
Western Australia	Western Australia Area 6 Fishery	AMF	Sustainable	Catch, CPUE
Western Australia	Western Australia Area 7 Fishery	AMF	Sustainable	Catch, CPUE, fishery-independent recruitment surveys
South Australia	South Australia Western Zone Fishery	SAWZF	Undefined	

SAWZF South Australia Western Zone Fishery (SA), AMF Abalone Managed Fishery (WA)

STOCK STRUCTURE

Roe's Abalone are distributed from Shark Bay in Western Australia south around to western Victoria. Recent genetic evidence indicates the existence of one Roe's Abalone meta-population across the species distribution (sampled from Kalbarri in Western Australia to Spencer Gulf in South Australia) but with three differentiated adaptive population clusters [Sandoval-Castillo et al. 2015]. The southern adaptive population cluster extends across a substantial geographic range (Albany in Western Australia to Spencer Gulf in South Australia) traversing jurisdictional boundaries. The stock is currently managed as several separate units. Assessment of stock status is therefore presented here at the management unit level—Western Australia Area 2 Fishery, Western Australia Area 5 Fishery, Western Australia Area 6 Fishery,

Western Australia Area 7 Fishery and South Australia Western Zone Fishery.

STOCK STATUS

South Australia Western Zone Fishery

Prior to commercial catches, an experimental fishery for Roe's Abalone caught 45.4 t (whole weight) from November 2000 to December 2002 [Preece et al. 2004]. Results from the experimental fishery suggested that Roe's Abalone are widely, but patchily distributed across the Western Zone of South Australia with limited areas of high abundance [Preece et al. 2004]. In 2014, a maximum commercial catch limit of 11 t (whole weight) with a minimum legal length of 75 mm shell length (L50 estimated at 50–59 mm shell length [Preece et al. 2004]) was implemented under a Ministerial exemption. Best estimates of catch were between 61 per cent and 75 per cent of the total catch limit, with the species being targeted on very few days and by a small percentage of licence holders. There is no published assessment available for the South Australia Western Zone Fishery (SAWZF), and the data available are inadequate to estimate biomass or exploitation rates. There is little knowledge on recruitment or harvestable biomass, and there are no defined target or limit reference levels. This prevents assessment of current stock size or fishing pressure. Consequently, there is insufficient information available to confidently classify the status of this stock.

Based on the evidence provided above, the South Australia Western Zone Fishery management unit is classified as an **undefined stock**.

Western Australia Area 2 Fishery

Catches in the Western Australian Abalone Fisheries (Area 2, 5, 6 and 7) are controlled by a total allowable commercial catch (TACC), set annually by the harvest control rule defined in the Abalone Resource of Western Australia Harvest Strategy 2016–21 [DoF 2017]. The harvest control rule uses a three year moving average of standardised catch per unit effort (CPUE) as the key Performance Indicator (PI) against area-specific limit, threshold and target reference levels, which correspond to commercial catch rates at 20 per cent, 30 per cent and 40 per cent of unfished stock levels. Reference levels were calculated using an index of spawning biomass derived from fishery-independent surveys in the Western Australia Area 7 Fishery during a specified reference period of recruitment stability (1997–2010). These fishery-independent data were used to calibrate the fishery-dependent CPUE for Roe's Abalone to unfished levels in the management units, based on data collected from an area closed to fishing during the same reference period [DoF 2017].

In the Western Australia Area 2 Fishery (WAA2F) catches of Roe's Abalone were between 61 per cent and 90 per cent of TACC for the last four years, compared to over 90 per cent of the TACC before 2004. The commercial Industry has attributed the reduced catch in recent years to economic (beach price and market competition) and accessibility (remote region and prevailing weather) factors. The annual CPUE exhibited a sharp decline after 2012 and reached a historical low in 2015. In the last two years the CPUE has increased to pre-2012 levels, following lower catches over the last four years. Even at the historical low in 2015 the annual CPUE and PI were above the target reference level. The fishery has a legal minimum length of 60 mm, which allows 1–2 years of spawning to occur before recruitment to the fishery. The above evidence indicates that the biomass of this stock is unlikely to be depleted, that recruitment is unlikely to be impaired and that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

Based on the evidence provided above, the Western Australia Area 2 Fishery management unit is classified as a **sustainable stock**.

Western Australia

Catches in the Western Australia Area 5 Fishery (WAA5F) are managed by the same process as described above in the WAA2F and defined in the Abalone

**Area 5
Fishery**

Resource of Western Australia Harvest Strategy 2016–21 [DoF 2017]. In the WAA5F the catch was 6.9 t (whole weight) in 2017, which was 35 per cent of the TACC. Over the last four years less than 40 per cent of the annual TACC has been caught, and the full allocation has not been caught since the early 2000's. The commercial Industry has attributed the reduced catch in recent years to economic (beach price and market competition) and accessibility (remote region and prevailing weather) factors. Annual SCPUE was relatively stable between 1995 and 2012, declined in 2013 and has remained stable but slightly lower than the historical average over the last four years. The annual SCPUE and PI have always been above the target reference level. The fishery has a legal minimum length of 60 mm, which allows 1–2 years of spawning to occur before recruitment to the fishery. The above evidence indicates that the biomass of this stock is unlikely to be depleted, that recruitment is unlikely to be impaired and that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

Based on the evidence provided above, the Western Australia Area 5 Fishery management unit is classified as a **sustainable stock**.

**Western
Australia
Area 6
Fishery**

Catches in the Western Australia Area 6 Fishery (WAA6F) are managed by the same process as described above in the WAA2F and defined in the Abalone Resource of Western Australia Harvest Strategy 2016–21 [DoF 2017]. In the WAA6F the Roe's Abalone catch was 37 per cent of the TACC in 2017. The TACC has been constant since 1999 at 12 t (whole weight), while prior to 2011, 90 per cent or greater of the TACC was caught annually. Since 2011 the catch has declined to less than 5 t annually and remained at this level for the last four years. The commercial Industry has attributed the reduced catch in recent years to economic (beach price and market competition) and accessibility (remote region and prevailing weather) factors. After a period of relative stability (1998 to 2011) the annual SCPUE declined sharply between 2011 and 2013 to the lowest level on record but remained just above the target reference level. In 2014 the annual SCPUE increased and since then has remained stable, although with a high degree of uncertainty around the estimate. The increase in annual SCPUE and high uncertainty from 2014 onwards has resulted from the decline in catch since 2011 and the very low levels of catch between 2014 and 2017. This reduction in catch contributed to the annual SCPUE remaining above the target reference level. The fishery has a legal minimum length of 60 mm, which allows 1–2 years of spawning to occur before recruitment to the fishery. The above evidence indicates that the biomass of this stock is unlikely to be depleted, that recruitment is unlikely to be impaired and that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

Based on the evidence provided above, the Western Australia Area 6 Fishery management unit is classified as a **sustainable stock**.

**Western
Australia
Area 7
Fishery**

Catches of Roe's Abalone in the Western Australia Area 7 Fishery (WAA7F) are managed as described for other management units above, with the addition of a stock prediction model [DoF 2017]. This model uses a fishery-independent survey recruitment index (Age 1+) along with an annual summer sea surface temperature (SST) index to predict the density of harvest-sized animals (71+ mm) and set the annual TAC. The TAC is then separated into the commercial TACC and recreational TARC by using the available biomass in each habitat and both sectors pattern of usage.

The commercial catch in the WAA7F was 99 per cent of the TACC in 2017 (23.7 t whole weight) and has exceeded 98 per cent of the allocated TACC every year other than 2012 and 2016. Changes in catch therefore result from changes in the TACC. The recreational catch estimate for 2017 was 23–27 t (25 t) whole weight and has been managed to the 20 t (\pm 2 t) TARC for the last 7 years. The catch was higher than the TARC in 2017 due to a 10 per cent increase in

average weight of animals caught.

The annual SCPUE steadily declined between 2005 and 2014 but has since increased in each of the last three years, currently being above the target reference level and the TACC was set using the stock prediction model. Arresting the decline and the subsequent increase in annual SCPUE resulted partially from a TACC reduction in 2014 (11 per cent), a voluntary in-season commercial catch reduction in 2016, and implementation of the stock prediction model in 2017 (setting the TACC at 67 per cent of long-term commercial sustainable harvest level).

Fishery-independent surveys determined that the density of harvest-sized Roe's Abalone in both the subtidal and platform habitats, and across both fished and unfished areas experienced substantial declines between 2002 and 2012. The density of harvest-sized animals on the reef platform has increased in the last three years from the record-low levels during 2012–15, and density on the subtidal habitat is at the highest level since 2011. This increase indicates increased productivity (recruitment and growth) in response to good environmental conditions (low summer SST) during this time. Age 1+ (17–32 mm) animals have shown an increase in density over the last three years, after juvenile recruitment density declined by 80 per cent between 2010 and 2013 (following the 2011 marine heatwave), with 2015 being the lowest year on record. The marine heatwave in 2011 had a range of effects on the abalone stocks, including the decline in large animals, growth stunting, recruitment impairment and a decline in spawning biomass [Hart et al. 2018]. Note, that while all stock indicators have increased again in 2018, they are still below pre-heatwave levels.

The fishery has a legal minimum length of 60 mm, which allows 1–2 years of spawning to occur before recruitment to the fishery. However, the commercial sector targets large animals (71+ mm), which allows 2–3 years of spawning to occur before harvest. The above evidence indicates that the biomass of this stock is unlikely to be depleted, that recruitment is unlikely to be impaired and that the current level of fishing mortality is unlikely to cause the stock to become recruitment impaired.

Based on the evidence provided above, the Western Australia Area 7 Fishery management unit is classified as a **sustainable stock**.

BIOLOGY

Roe's Abalone biology [Hancock 2004, Keesing 1984]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Roe's Abalone	15 years, 89 mm SL	3 years, 40 mm SL

DISTRIBUTION



Distribution of reported commercial catch of Roe's Abalone.

TABLES

Commercial Catch Methods	South Australia	Western Australia
Diving	✓	✓
Fishing methods		
	South Australia	Western Australia
Commercial		
Diving	✓	✓
Indigenous		
Diving		✓
Various	✓	
Recreational		
Diving		✓
Various	✓	
Management Methods		
	South Australia	Western Australia
Commercial		
Limited entry	✓	✓
Size limit	✓	✓
Total allowable catch	✓	✓
Indigenous		
Bag limits	✓	✓
Size limit	✓	✓

Recreational		
Bag limits	✓	✓
Licence		✓
Size limit	✓	✓
Spatial closures		✓
Temporal closures		✓

Active Vessels		
	South Australia	Western Australia
	22 in SAWZF, 22 Exemption in SAWZF,	23 in AMF,

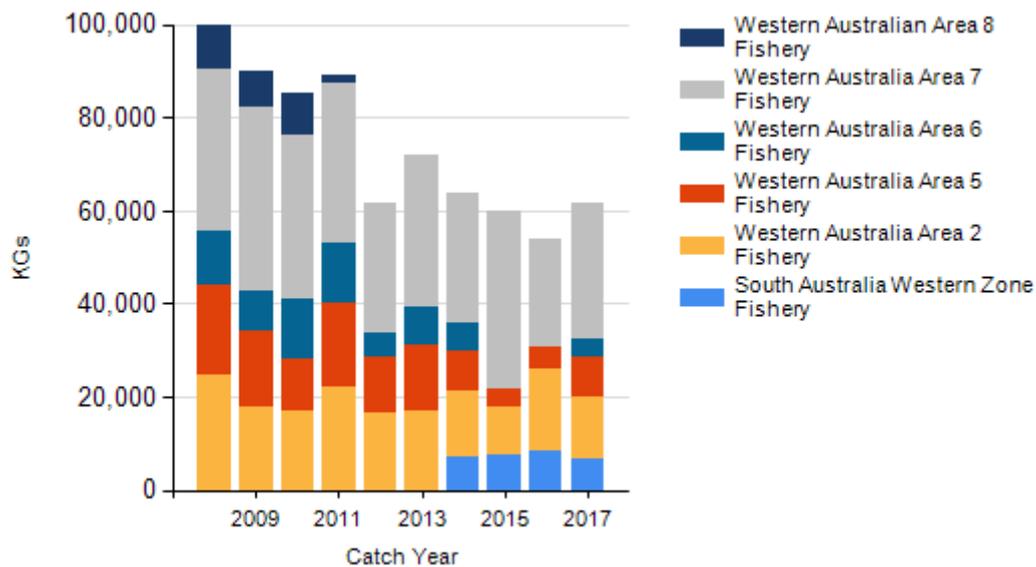
SAWZF South Australia Western Zone Fishery(SA)

AMF Abalone Managed Fishery(WA)

Catch		
	South Australia	Western Australia
Commercial	6.72297t in SAWZF,	54.8953t in AMF,
Indigenous	Unknown	Unknown
Recreational	Unknown	25 t in WAA7F plus 14 t in WAA2F, WAA5F and WAA6F combined

SAWZF South Australia Western Zone Fishery (SA), AMF Abalone Managed Fishery (WA),

CATCH CHART



Commercial catch of Roe's Abalone - note confidential catch not shown.

EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

ENVIRONMENTAL EFFECTS on Roe's Abalone

References	
1083	Department of Fisheries (DoF), Western Australia 2017. Abalone resource of Western Australia harvest strategy 2016–2021. Fisheries Management Paper No. 283. Department of Fisheries, Western Australia, Perth. 36pp.
1084	Hancock, B 2004, The biology and fishery of Roe's abalone <i>Haliotis roei</i> Gray in south-western Australia, with emphasis on the Perth fishery. PhD thesis, University of Western Australia. 184pp.
1085	Hart, AM, Strain, LWS and Brown, J 2018, Regulation dynamics of exploited and protected populations of <i>Haliotis roei</i> , and their response to a marine heatwave. ICES Journal of Marine Science, doi:10.1093/icesjms/fsy064.
1086	Keesing, J 1984, Reproductive biology of the abalone <i>Haliotis roei</i> Gray, 1827, in south-western Australia. Honours Thesis. Murdoch University, Western Australia. 99 pp
1087	Preece P, Mayfield S and Saunders T 2004. Biology of and feasibility fishing for Roe's abalone (<i>Haliotis roei</i>). Final report to the Abalone Industry Association of South Australia. SARDI Aquatic Sciences Publication No. RD04/2002:64.
1088	Sandoval-Castillo, J, Robinson, N, Strain, L, Hart, A and Beheregaray, LB 2015, Use of next generation DNA technologies for revealing the genetic impact of fisheries restocking and ranching. Australian Seafood CRC Report, No. 2012/714. Flinders University, Adelaide, 47pp.